UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

Science and Ecosystem Support Division
Ecological Assessment Branch
980 College Station Road
Athens, GA 30605-2720

June 13, 2012

R4SESD-EAB

MEMORANDOM

Subject: Barite Hill/Nevada Goldfields Hawe Creek Watershed Bioassessment
Quality Assurance Project Plan

Project Number: 12-0486

From: Lonnie Dorn, Life Scientist
Aquatic Biology Section

Thru: Chris Decker, Chief
Aquatic Biology Section

To: Candace Teichert
Superfund Division

Attached is a copy of Quality Assurance Project Plan. This version precludes any earlier versions released.

If you have any questions, please contact me at 706-355-8683.

Attachments

United States Environmental Protection Agency
Region 4
Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720

Barite Hill/Nevada Goldfields
Hawe Creek Watershed Bioassessment
Quality Assurance Project Plan

McCormick, South Carolina
June 2012

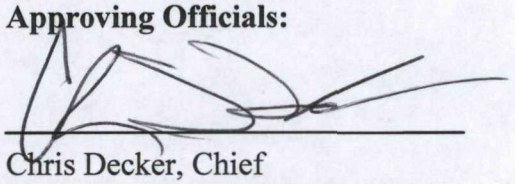
SESD Project Identification Number: 12-0486

Requestor: Candice Teichert
Superfund Division
61 Forsyth St. SW
Atlanta, Georgia 30303-8960

SESD Project Leader: Lonnie Dorn
SESD, Ecological Assessment Branch
980 College Station Road
Athens, Georgia 30605-2720

Approval Sheet

Approving Officials:

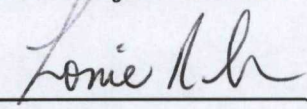


6/13/12

Chris Decker, Chief
Environmental Protection Agency
Ecological Assessment Branch
Aquatic Biology Section

Date

SESD Project Leader:



6/13/12

Lonnie Dorn
Environmental Protection Agency
Ecological Assessment Branch
Aquatic Biology Section

Date

This quality assurance project plan (QAPP) has been prepared according to: EPA Requirements for Quality Assurance Project Plans (EPA QA/R5 EPA/240/B-01/003, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001 (US EPA, 2001).

This document will be used to ensure that environmental and related data collected, compiled, and/or generated for this project are of the type, quantity, and quality required for their intended purposes within the limitations of available resources.

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Figures

Tables

1.0 QAPP Distribution List

Table 1: QAPP Distribution List

Recipient	Organization	Telephone Number	Address/Email Address
Candice Teichert	Environmental Protection Agency (EPA)	404-562-8821	Superfund Division 61 Forsyth St. SW Atlanta, Georgia 30303-8960 teichert.candice@epa.gov
Laura Ackerman	Environmental Protection Agency (EPA	706-355-8776	Science and Ecosystem Support Division (SESD) 980 College Station Rd. Athens, GA 30605 ackerman.laura@epa.gov

2.0 Project Organization

Requesting Program: Candice Teichert, Superfund Division

Responsibilities: Superfund Division personnel requested SESD support to assess surface waters of Hawe Creek and its tributaries approximately 3 miles southwest of McCormick, SC. The primary objective is to determine the ecological health of targeted streams within the watershed.

Principal Data User: Candice Teichert, EPA Superfund Division

Project Leader: Lonnie Dorn, EPA Science and Ecosystem Support Division

Responsibilities: The project leader will be responsible for planning and implementing the field study to meet the data quality objectives. The project leader is responsible for:

- Quality Assurance Project Plan (QAPP) preparation
- ensuring the QAPP is implemented as written
- all data collection activities
- collation of study data; and
- report preparation

Table 2: Project Study Team

Team Members	Organization	Responsibility	Contact
Lonnie Dorn	SESD/EAB/ABS	Project Leader/ Macroinvertebrate Sampling/Habitat	706-355-8683

		Evaluation	
Nathan Mangle	ILS/ESAT	Macroinvertebrate Sampling/Sonde calibration/ *In situ* Water Quality Measurements	706-355-8642

Data Review: Internal peer review by EPA Science and Ecosystem Support Division Senior Scientists. Report will also be reviewed by EPA Superfund Division.

Responsibilities: Upon completion of the draft report, copies will be provided to SESD Senior Scientists and EPA Superfund Division personnel for review. Once comments are addressed, a final report will be distributed.

3.0 Project Management

3.1 Site Description

The Hawe Creek watershed is a subwatershed of the Savannah River which is located in western South Carolina. It is located within the level 4 ecoregion 45(c), the Carolina Slate Belt of the Piedmont ecoregion. This ecoregion contains mineral-rich metavolcanic and metasedimentary rocks with slatey cleavage which are finer-grained and less metamorphosed than most Piedmont regions. It tends to be less rugged and less dissected than other Piedmont areas, and it generally has more silty and silty clay soils. Streams tend to dry up and water yields to wells are low as this region contains some of the lowest water-yielding rock units in the Carolinas (US EPA 2002).

3.2 Background

The Barite Hill/Nevada Goldfields were mined from 1991 until 1995, when mining activities ceased and site reclamation activities began. In 1999, Nevada Goldfields Inc. filed for bankruptcy and turned the site over to SCDHEC. Since that time several efforts have been made to treat the waste left behind on the site. Several bioassessments were completed in the early 1990's by Shealy Environmental Service, Inc. This data is available and may be used to make comparisons to data collected during this study.

3.3 Problem Definition

Staff from the Superfund Division identified a potential source of sediment and other pollutants coming from tributaries into Hawe Creek. Concern exists over water quality conditions within the watershed and the potential adverse impacts to aquatic life. SESD has been asked to evaluate the ecological health of these

tributaries and Hawe Creek.

3.4 Project Description

During the week of June 18, 2012, SESD will sample macroinvertebrate communities in surface waters of Hawe Creek and its tributaries located in McCormick, SC. The primary task is to determine the ecological health of these streams. This will be accomplished by collecting macroinvertebrate samples in accordance with SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling (SCDHEC 2011) at targeted stream sites along with performing measurements of *in situ* water quality in accordance with Operating Procedure for *In Situ* Water Quality Monitoring SESDPROC-111-R2 (US EPA 2009) and completion of habitat assessment forms for high-gradient streams (Barbour et al.1999). In addition, Global Positioning System (GPS) data will be collected at targeted stream sites in accordance with SESD Operating Procedure for Global Positioning System SESDPROC-110-R3 (US EPA 2011).

These tasks will be conducted in accordance with SESD Operating Procedures as described in section 4.2 of this document. All records and documents for this survey will be handled in accordance with SESD Operating Procedure for Report Preparation and Distribution SESDPROC-003-R3 (US EPA 2009a), SESD Operating Procedure for Logbooks SESDPROC-010-R4 (US EPA 2010), SESD Operating Procedure for Control of Records SESDPROC-002-R5 (US EPA 2010a), and SESD Operating Procedures for Project Planning SESDPROC-016-R2 (US EPA 2010b).

Table 3 contains a list of estimated project timelines.

Table 3: Project Schedule/Timeline

Activity	Organization	Anticipated Date of Completion	Deliverable
QAPP Preparation	SESD/EAB/ABS	June 1, 2012	Finalized QAPP
Field Investigation	SESD/EAB/ABS	June 18, 2012	Macroinvertebrate samples and *In situ* water quality data collected
Data Generation	SESD/EAB/ABS/ILS	August 6, 2012	Macroinvertebrate Taxa List and Metric Calculations
Report Generation	SESD/EAB/ABS	September 30, 2012	Final Report to Superfund Division

3.5 Quality Objectives and Criteria for Measurement Data

The primary objective of this study is to assess ecological health of Hawe Creek and targeted tributaries in the vicinity of the Barite Hill/Nevada Goldfields Site near McCormick, SC. Data quality objectives (DQOs) for this study are provided in Appendix A.

3.6 Special Training Requirements

Per SESD's Field Branches Quality System, the project leader and sampler who will accompany the project leader have been deemed competent by SESD management to conduct ecological surveys/assessments required to fulfill the prescribed goals of this project. Additionally, these project members are trained and competent to conduct the ecological assessment. described field activities.

3.7 Documents and Records

Dedicated, bound field logbooks will be used to record all information (US EPA 2010). The QAPP and final report will be prepared in accordance to SESD Operating Procedures for Project Planning (US EPA 2010b) and Report Preparation and Distribution (US EPA 2009a), respectively. The report will include a tabular presentation of results, discussion, data usability and conclusions. Upon completion and transmittal of the report to the appropriate parties, project records will be submitted to the SESD Records Room.

The files will be maintained in the SESD Records Room according to the EPA records schedule as described in Control of Records (USEPA 2010a). The most current records schedules are available at http://epa.gov/records/policy/schedule.

4.0 Data Generation and Acquisition

4.1 Study Design

An authoritative approach was enlisted for sample site selection due to existing data and field observations. One macroinvertebrate sample will be collected in accordance with SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling at each station along with *in situ* water quality measurements. *In situ* measurements will include dissolved oxygen, pH, conductivity, and temperature at mid- depth and within the thalweg at each station. In addition, an evaluation of physical habitat will be completed at each site. Potential sample station locations are listed in Table 4 and shown in Figure 1. Figure 2 shows an overall view of the site and is used to identify where sediment and water samples have been collected. During a bioassessment performed at the site in February 2012 by SESD, beaver activities and subsequent ponding of water was identified within one of the tributaries (final report in progress). Therefore, if similar conditions are encountered during this assessment, several sample stations may be deemed not suitable for data collection via the SC method and will be

be omitted. The determination whether to sample will be made by the project leader once the sampling team is on site and have assessed the area to be sampled.

Table 4: Sample site locations

Site Identification	Location	Approximate GPS Coordinates (Lat/Long)
MBH116	Unnamed tributary of Hawe Creek's eastern drainage above mine influence	33.87850 -82.29334
MBH119	Unnamed tributary of Hawe Creek's eastern drainage just below initial mine influence and above Main pit overflow	33.87635 -82.29688
MBH121	Unnamed tributary of Hawe Creek's eastern drainage below mine influence and below Main pit overflow	33.87549 -82.30278
MBH122	Unnamed tributary of Hawe Creek's eastern drainage just upstream of confluence and below mine and Main pit overflow influences.	33.87470 -82.30819
MBH123	Unnamed tributary of Hawe Creek's southern drainage just upstream of confluence and below beaver ponds	33.87421 -82.30834
MBH124	Hawe Creek above confluences of the two unnamed tributaries	33.87519 -82.30824
MBH125	Hawe Creek below confluences of the two unnamed tributaries	33.87478 -82.30903
MBH126	Hawe Creek below confluences of the two unnamed tributaries and downstream of bridge at SSR 44	33.87460 -82.31166
MBH127	Unnamed tributary of Hawe Creek's southern drainage just below beaver ponds	33.87072 -82.30551
MBH129	Unnamed tributary of Hawe Creek's southern drainage in the vicinity of beaver ponds.	33.86934 -82.30465

4.2 Sampling Methods

The information provided in Table 5 include all measurements, methods, and forms deemed potentially necessary to complete the proposed project.

Table 5: Data collected at each sampling location.

Measurement	Method	Forms/Records/Results
Ecological Health	SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling	Digital Photographs stored on memory cards and downloaded to laptop computer.
In Situ Water Quality using a Hydrolab Quanta	Operating Procedure for In Situ Water Quality Monitoring SESDPROC-111-R2	Data Recorded in Field Logbook
Global Positioning System Locational Data using Garmin Colorado 400t	Operating Procedure for Global Position System SESDPROC-110-R3	Data Recorded in Field Logbook
Habitat Quality	Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (Barbour et al. 1999)	Habitat Assessment Form (High Gradient Form)

4.3 Sampling Method/Data Acquisition

Any documents, forms, notes and/or recorded data relevant to this study will be completed jointly by the project team. Both GPS coordinates and digital images will be recorded as prescribed respectively by SESD Operating Procedure Global Positioning System SESDPROC-110-R2 (US EPA 2011) and by Operating Procedure for Sample and Evidence Management SESDPROC-005-R1 (US EPA 2007). All observations will be recorded in the field logbook as prescribed by SESD Operating Procedures SESDPROC-010-R4 (US EPA 2010). If any changes to the sampling plan or measurement system occurs, or corrective actions are needed, the project leader will determine the course of action.

4.4 Sample Handling and Custody

Macroinvertebrate samples will be handled in accordance with SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling (SCDHEC 2011).

4.5 Sample Processing

Benthic macroinvertebrate samples will be processed in accordance with SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling

(SCDHEC 2011) in house by Integrated Laboratory Systems (ILS) contractors. A work order has been issued for these services and processing time for sample results is acceptable to meet the time frame for report generation.

4.6 Quality Control

All documents/forms produced from this study will be completed following measurement guidance described by SESD Operating Procedures and/or other referenced manuals listed in Table 5 of this document as well as by peer review from accompanying team scientists. Quality Control of macroinvertebrate samples will be performed in accordance with SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling (SCDHEC 2011).

4.7 Equipment Maintenance and Calibration

All equipment used during this study will be maintained and calibrated according to SESD Operating Procedure for Equipment Inventory and Management SESDPROC-108-R3 (US EPA 2009c). Spare parts for all critical elements of the study will be taken to the field in the event of a malfunction.

4.8 Inspection/Acceptance for Supplies and Consumables

All critical supplies and consumables for this field study are inspected and maintained in accordance with the following procedures:

SESD Operating Procedure for Purchasing of Services and Supplies SESDPROC-015-R3 (US EPA 2009b).
SESD Operating Procedure for Equipment Inventory and Management SESDPROC-108-R3 (US EPA 2009c).
SESD Operating Procedure for Field Sampling Quality Control SESDPROC-011-R3 (US EPA 2010c).

The SESD Field Quality Manager and the Branch Quality Assurance Officers are responsible for ensuring that these requirements are met.

4.9 Non-direct Measurements

n/a

4.10 Data Management

The project leader will be responsible for ensuring that all requirements for data management are met. All field data generated during this study, whether hand-recorded or obtained using an electronic data logger will be recorded, stored and managed according to the SESD Operating Procedures for Control of Records

SESDPROC-002-R5 (US EPA 2010a), Sample and Evidence Management SESDPROC-005-R1 (US EPA 2007), and Logbooks SESDPROC-010-R4 (US EPA2010).

5.0 Assessment/Oversight

5.1 Assessments and Response Actions

Assessments will be conducted during the field investigation according to the SESD Operating Procedure for Project Planning (US EPA 20010b) to ensure the QAPP is being implemented as approved.

The project leader is responsible for all corrective actions while in the field. Any issues that may arise during the study will be documented in the logbooks. This documentation and any corrective actions taken will be used to determine the overall quality and usability of the data.

5.2 Reports to Management

The project leader will be responsible for notifying the project requestor and appropriate SESD management if any circumstances arise during the field study that may adversely impact the quality of the data collected. Any problems noted during field sampling that could result in unusable data will be addressed in the final report.

6.0 Data Validation and Usability

6.1 Ecological Stream Health

This study will be conducted utilizing the SCDHEC SOP for macroinvertebrate collections within the prescribed index period for macroinvertebrate collections (June 15-September 15) and will generate data that will be used to assess site conditions (SCDHEC 2011).

6.2 Data Validation/Usability

All data derived from SESD field measurements will be reviewed, verified, validated and reported in accordance with the SESD Operating Procedure for Report Preparation and Distribution SESDPROC-003-R3 (US EPA 2009a).

7.0 References

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton,

Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

South Carolina Department of Health and Environmental Control. 2011. Standard Operating and Quality Control Procedures for Macroinvertebrate Sampling (DRAFT). Technical Report No. xxx-11. Bureau of Water. Columbia, South Carolina.

US EPA 2002. Ecoregions of North and South Carolina. Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B., 2002, Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

US EPA 2007. Operating Procedure for Sample and Evidence Management SESDPROC-005-R1, Region 4, SESD, Athens, GA

US EPA 2009. Operating Procedure for *In Situ* Water Quality Monitoring SESDPROC-111-R2, Region 4, SESD, Athens, GA

US EPA 2009a. Operating Procedure for Report Preparation and Distribution SESDPROC-003-R3, Region 4, SESD, Athens, GA

US EPA 2009b. Operating Procedures for Purchasing of Services and Supplies SESDPROC-015-R3, Region 4, SESD, Athens, GA

US EPA 2009c. Operating Procedures for Equipment Inventory and Management SESDPROC-108-R3, Region 4, SESD, Athens, GA

US EPA 2010. Operating Procedure for Logbooks SESDPROC-010-R4, Region 4, SESD, Athens, GA

US EPA 2010a. Operating Procedure for Control of Records SESDPROC-002-R5, Region 4, SESD, Athens, GA

US EPA 2010b. Operating Procedure for Project Planning SESDPROC-016-R2, Region 4, SESD, Athens, GA

US EPA 2010c. Operating Procedure for Field Sampling Quality Control SESDPROC-011-R3, Region 4, SESD, Athens, GA

US EPA 2011. Operating Procedure for Global Position System SESDPROC-110-R3, Region 4, SESD, Athens, GA

Figures

Figure 1: Map of Sampling Locations

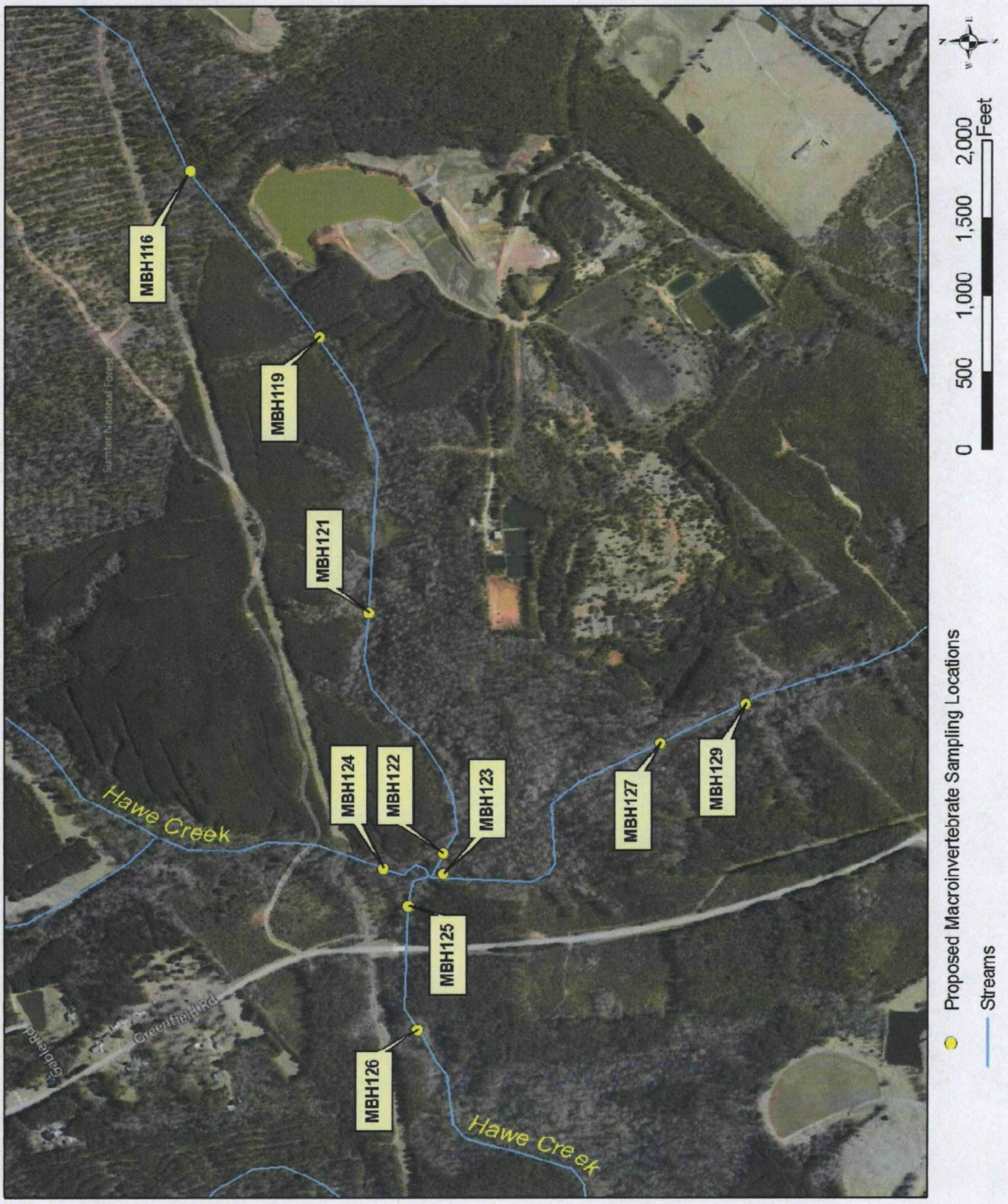
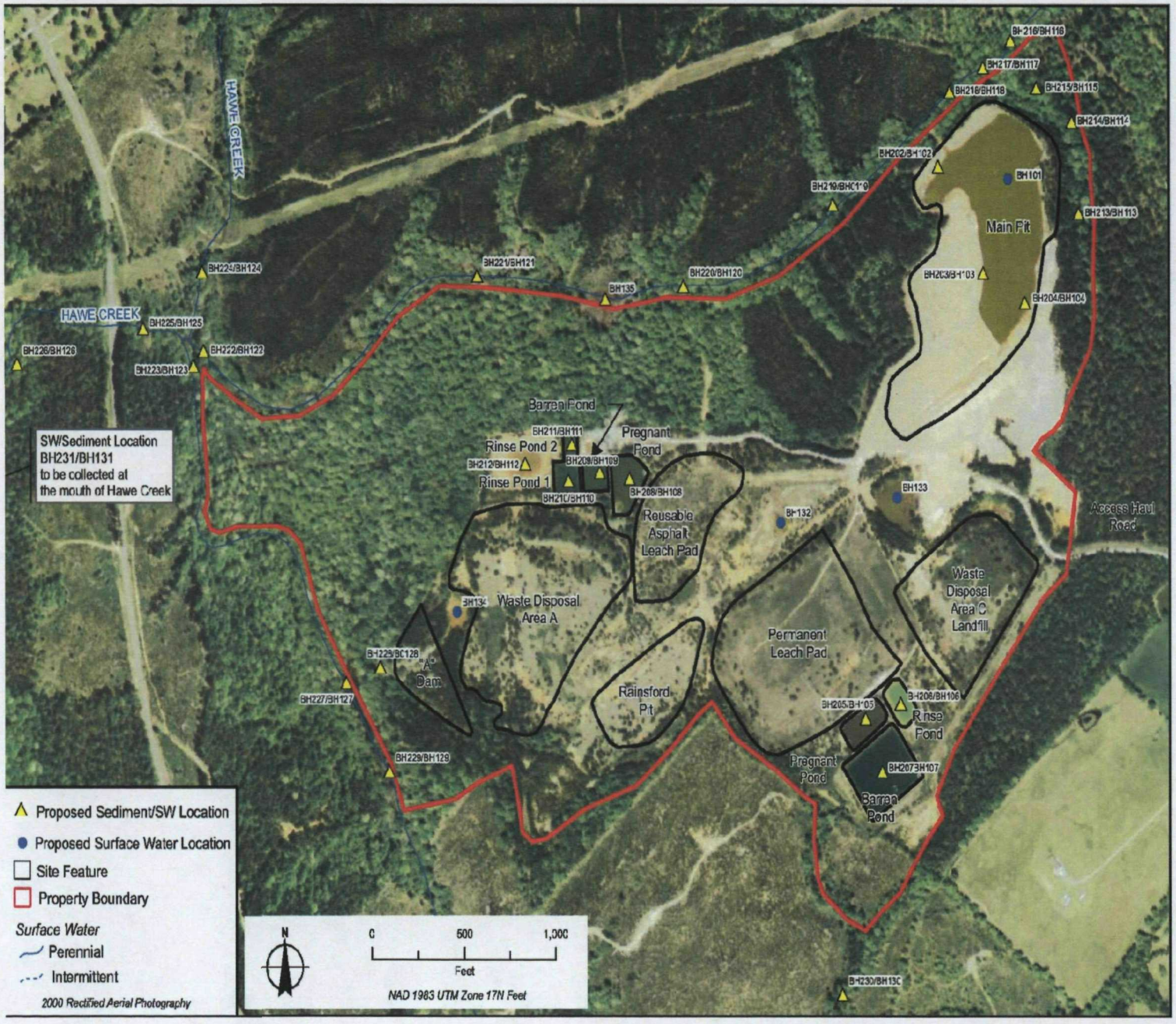


Figure 2: Sediment and Surface Water Sampling Locations from Previous Studies



Appendix A: Data Quality Objectives

STEP	DATA QUALITY OBJECTIVES		DESCRIPTION
1	State the Problem	• Concise description of the problem • Identify members of the planning team and the primary decision maker • Develop a conceptual model of the environmental hazard to be investigated • Determine resources – budget, personnel, and schedule	Description of Problem The United States Environmental Protection Agency (USEPA) SFD needs to determine the ecological health of Hawe Creek and targeted tributaries within the watershed and identify possible stressors. Planning Team Lonnie Dorn* R4, SESD, Macroinvertebrate Survey Candice Teichert R4, SFD Laura Ackerman R4, Enforcement and Investigations Branch Brian Striggow R4, Enforcement and Investigative Branch *Primary Decision Maker for Field Study Conceptual Model EPA staff from the Superfund Division identified a potential source of sediment and other pollutants coming from tributaries to Hawe Creek. Concern exists over water quality conditions within the watershed and the potential adverse impacts to aquatic life. SESD has been asked to evaluate the ecological health of these tributaries and Hawe Creek. Resources/Personnel/Schedule Equipment and personnel support are available and in place. Field survey/analysis will be performed during the week of June 18, 2012. The final report will be prepared by the project leader and presented to the project requestor by September 30, 2012.
2	Identify the Goal of the Study	• Identify the principal study question • Define the alternative actions that could result from resolution of the principal study question.	Principal Study Questions 1. Are the targeted streams supporting healthy benthic communities?

STEP	DATA QUALITY OBJECTIVES		DESCRIPTION
		• For decision problems, develop decision statements(s), organize multiple decisions. • For estimation problems, state what needs to be estimated and key assumptions.	Alternative Action Any actions will be determined by the SFD of EPA based on the data generated by this field study. Estimation Statement SFD wishes to determine the ecological condition of targeted streams. Efforts on the behalf of EPA SESD in field survey/analysis of the prescribed study will generate officially recognized documents/forms that will conclude on such matters requested by SFD.
3	Identify Information Inputs	• Identify types and sources of information needed to resolve decisions or produce estimates. • Identify the basis of information that will guide or support choices to be made in later steps of the DQO process. • Select appropriate sampling and analysis methods for generating the information	Information Type and Source Macroinvertebrate sampling along with *in situ* water quality measurements and habitat assessments will provide the needed information to determine ecological health of targeted streams. Guidance from SCDHEC Standard Operating and Quality Control Procedure for Macroinvertebrate Sampling as well as any existing data from the previous study will be used to aid in decision making.
4	Define the Study Boundaries	• Define the target population of interest and its relevant spatial boundaries. • Define what constitutes a sampling unit. • Specify temporal boundaries and other practical constraints associated with sample/data collection. • Specify the smallest unit on which decisions or estimates will be made.	Target population spatial boundaries Field investigations/surveys will be performed at targeted streams located in the Hawe Creek watershed. A sampling unit will consist of one macroinvertebrate sample, one *in situ* water quality measurement, and one habitat assessment at each site.

STEP	DATA QUALITY OBJECTIVES		DESCRIPTION
			Temporal Boundary Field investigations/surveys will be performed during the week of June 18, 2012. Practical Constraints During projected time of investigation climatic issues, including but not limited to tropical storms, may prevent the execution of the proposed study.
5	Develop the Analytic Approach	• Specify appropriate population parameters for making decisions or estimates. • For decision problems, choose a workable Action level and generate and "If....then....else" decision rule which involves it. • For estimation problems, specify the estimator and the estimation procedure.	N/A
6	Specify Performance or Acceptance Criteria	• For decision problems, specify the decision rule as a statistical hypothesis test, examine consequences of making incorrect decisions from the test, and place acceptable limits on the likelihood of making decision errors. • For estimation problems, specify acceptable limits on estimation uncertainty.	Decision Ruling The completion/recording of any documents, forms, and/or field notes will be done so by a peer-review process by at least two of the listed team members.
7	Develop the Plan for Obtaining Data	• Compile all information and outputs generated in Steps 1 through 6 above. • Use this information to identify alternative sampling and analysis designs that are appropriate for your intended use. • Select and document a design that will yield data that will best achieve your performance or acceptance criteria.	Sampling and Analysis Design The project team will make assessments based on interpretation of all data generated.

End of Document